

Give Me Air

Usually, we can breathe fresh air easily and naturally. But in confined spaces, that air can be hazardous. According to OPNAVINST 5100.23E, confined spaces are enclosures not designated for routine occupancy, which an employee may need to enter to perform work. In general, such spaces have poor ventilation, limited means of entry or egress, and contain potential or known hazards. Numerous confined spaces can be found on most Navy shore installations. Examples include storage tanks, process vessels, pits, vats, boilers, fuel cells, sewers, underground utility vaults, tunnels, and manholes.

Ventilation systems control the atmospheric hazards of confined spaces by replacing unsafe air with clean, breathable air. For most confined spaces, you must provide ventilation mechanically, with fans or other air-moving equipment.

When to Ventilate

Ventilate a confined space whenever it is hazardous in any of these ways:

- It contains too little or too much oxygen.
- It contains flammable or toxic gases or vapors.

Test the atmosphere before anyone enters a confined space.

Begin ventilating far enough in advance so the air will be safe before anyone enters the space.

Before anyone enters, test the atmosphere to make sure the ventilation has been working long enough. After someone enters, continue ventilating as long as anyone is in the space.

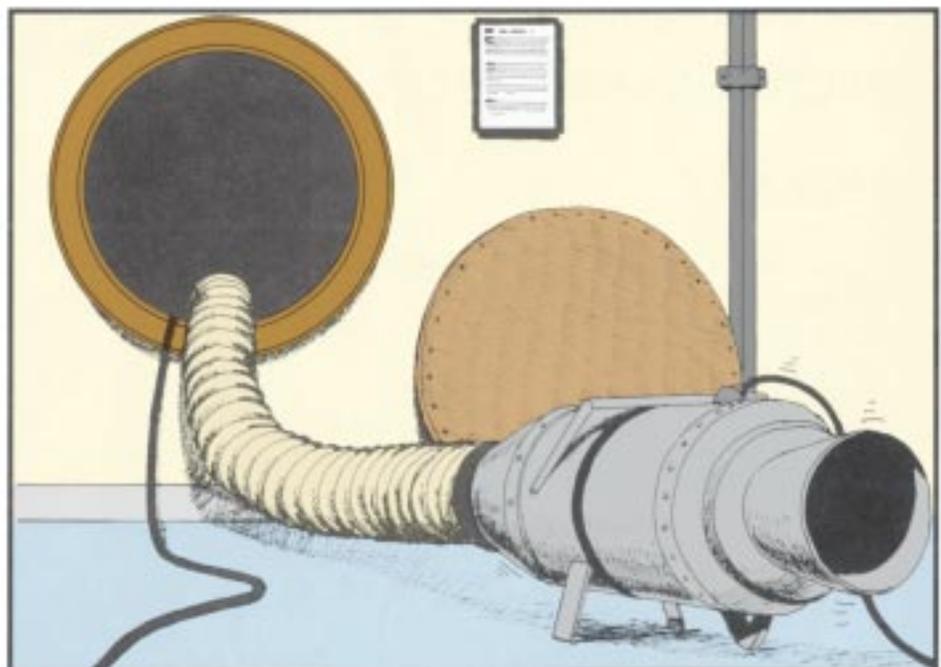
Continue ventilating until the oxygen level and concentrations of hazardous materials are within safe limits.

If workers are doing tasks that can make the air unsafe—such as welding, painting, coating, using solvents, and sandblasting—continue ventilation as long as the work is in progress.

The confined-space entry permit will tell you if you need continuous ventilation.

Testing the Atmosphere

There are some atmospheric hazards that ventilation alone can't reduce to safer levels. Atmospheric testing tells you when ventilation hasn't worked sufficiently. Always test the air in a confined space before anyone goes in. After entry, regularly test or continuously monitor the air to make sure it stays breathable.



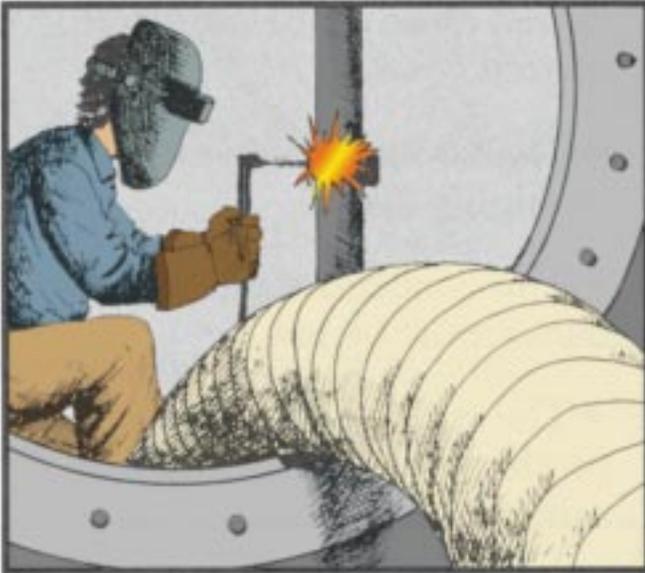
Kinds of Ventilation Systems

Local exhaust ventilation. This equipment captures contaminants at their points of origin and removes them. Local exhaust ventilation is the best way to control flammable and toxic materials produced at a single point.

Whenever possible, use local exhaust ventilation during hot-work and while cleaning with solvents. Keep the exhaust intake close to your work.

Local exhaust ventilation doesn't work well when contaminants are widely dispersed, and sometimes the location or shape of the confined space can make it hard to use. In these cases, use general ventilation instead.

Local exhaust ventilation



General ventilation. This flushes the atmosphere by supplying and removing large volumes of air. It does not reduce the amount of contaminants released, so there are limits on when it can be used.

For general ventilation to work well, workers should not be too close to the contaminant source. The contaminants must not be highly toxic. The concentration of contaminants must be low. The contaminants must be produced at a fairly uniform rate.

Be extra careful if you use general ventilation during certain hazardous work, such as hot-work. Retest the air often or monitor it continuously. Workers may need to wear respirators along with continuous ventilation.

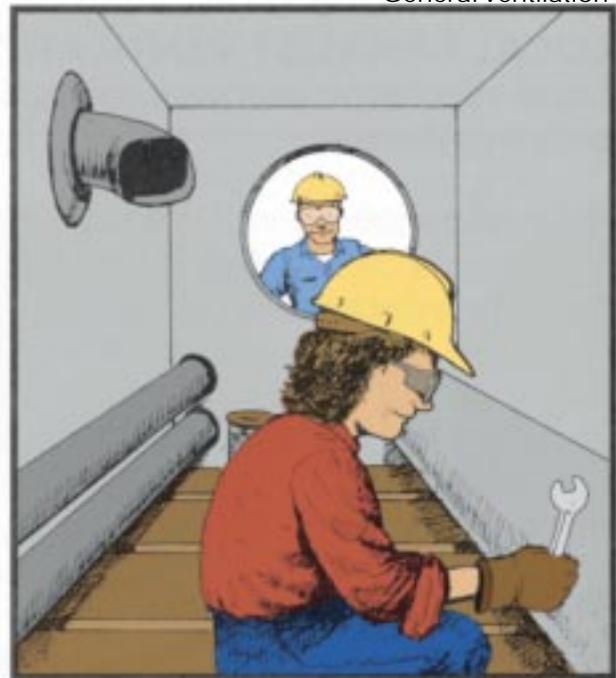
There are two types of general-ventilation systems: exhaust ventilation, which draws contaminated air out of an area, and supply ventilation, which blows fresh air into the space. Drawing out air is better when

the atmosphere could be flammable or toxic. Blowing in air can spread contaminants.

With either general or local exhaust ventilation, always use fresh air, never pure oxygen. Ground all electrical ventilation equipment. Use explosion-proof equipment. Place the intake for your air supply far from any flammable or toxic materials.

Ventilation systems may also produce contaminated exhaust. Locate the exhaust outlet so contaminants won't be drawn back into the confined space. Place the outlet where air currents will disperse the exhaust quickly, without endangering nearby people. You may have to filter the exhaust to prevent air pollution. If the exhaust could be flammable, remove all ignition sources from the area.

General ventilation



Always consult the manager of your command's confined-space program before entering any confined space. This article is only intended to raise awareness of the hazards associated with confined spaces. It is not intended to be an all-inclusive guide. Confined spaces that require permits are spaces that contain or have the potential to contain, a serious safety or health hazard. Refer to OPNAVINST 5100.23E Chapter 27.

Effective Ventilation

Ventilation must provide constant circulation of fresh air through all areas of a confined space. There are two main problems to watch out for:

- Recirculating contaminated exhaust back into the space (figure 1).
- Short circuiting the air flow or fresh air moving directly from the inlet to the exhaust outlet, without reaching the other areas of the space (figure 2).

You can avoid these problems in three ways:

- Use equipment that has enough power. Your equipment must be able to blow air far enough to ventilate the whole space. It must also be able to capture and carry away any contaminants. You may need a series of fans to move air long distances or to ventilate a large area.

- Locate your fresh-air inlets and exhaust outlets properly. If possible, the in-coming air and the exhaust air should move through separate openings, located far apart.

- Use duct work effectively. Duct work lets you direct the air flow to all areas of the space. Place your ducts where they won't be damaged by your work. Keep your ducts as short and straight (no sharp bends) as they can be and still reach the areas they must get to.

So, how would you know what kind of ventilation to use in a confined space? Ask yourself this question: Is ventilation needed only to provide oxygen or will it also have to remove flammable or toxic contaminants?

The answer will help you decide. ❏

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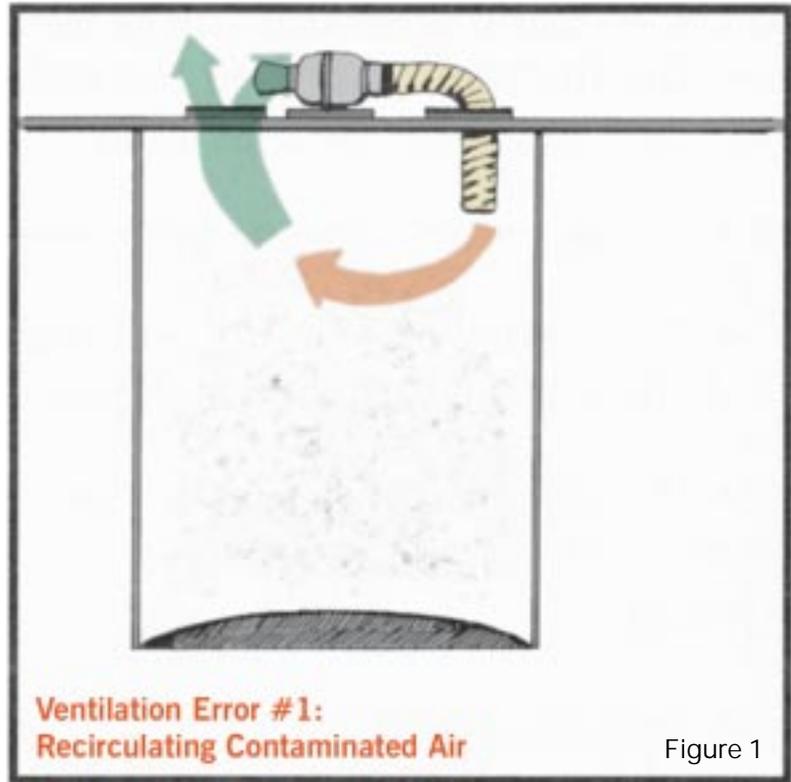


Figure 1

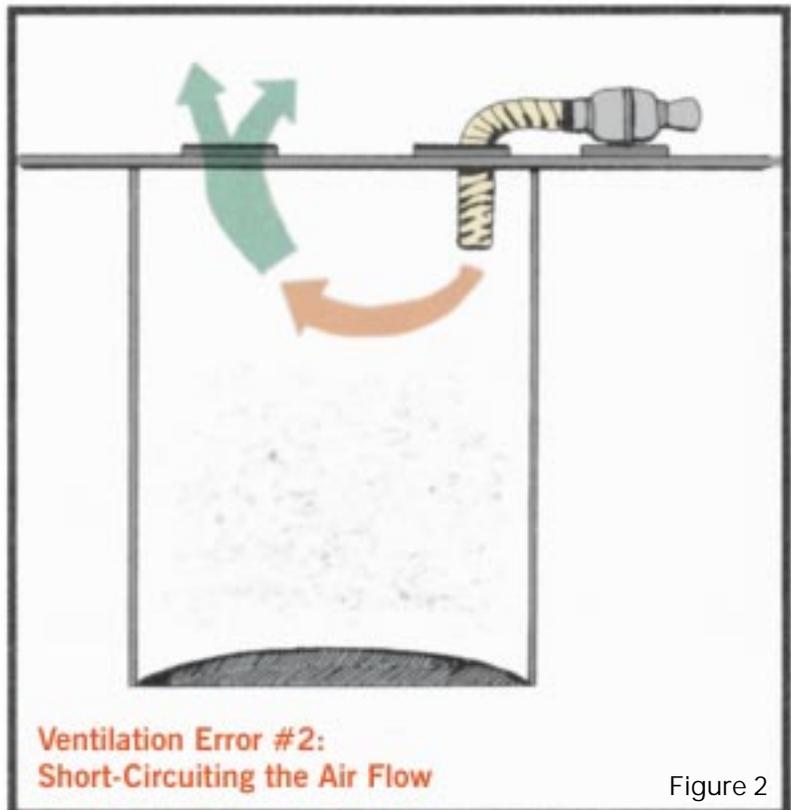


Figure 2